April 28, 2005

Ms. Terese A. Van Donsel
United States Environmental Protection Agency
Office of Superfund, Region 5
SR-6J
77 West Jackson
Chicago, IL 60604-3590

Subject: Implementation Plan Supplemental Pilot Study DNAPL Recovery System
Fields Brook Superfund Site
Detrex Source Area
Ashtabula, Ohio

Dear Ms. Van Donsel:

In response to the USEPA letter titled *Technical Support Issues Concerning the Addition of Experimental Extraction Wells and Site O&M, Detrex Source Control Area; Fields Brook Superfund Site* dated March 22, 2005, URS has prepared this Implementation Plan for the installation of two recovery wells for the Supplemental Pilot Study at the Detrex Facility. Figure 1 presents the organizational chart for key project personnel responsible for the Supplemental Pilot Study. Also attached as Appendix A, are a Statement of Qualifications (SOQ) and Contractor Capability Questionnaire (CCQ) for the drilling subcontractor, Bowser Morner, Dayton, Ohio. A site-specific Health & Safety Plan has been prepared for the implementation of field activities and is included for your review.

Also included for your review is the Monitoring Plan for the Source Control and DNAPL Pilot Recovery Systems. This Monitoring Plan will replace the monitoring section of the Operations and Maintenance Plan for the Site. The objective of the monitoring plan is to demonstrate the effectiveness of the slurry wall, the collection trenches and the DNAPL recovery system. The monitoring plan includes justification of selection of the monitoring well locations based on groundwater flow patterns and contaminant transport. The monitoring plan also includes a groundwater contour map, geological cross sections with well screen locations, and slurry wall and interceptor trench locations.

The field implementation plan is outlined in the following sections.

Recovery Well Installation

As proposed, two recovery wells (RW-SUP1 and RW-SUP2) will be installed as part of the Supplemental Pilot Study. Figure 2 presents the proposed locations of the

recovery wells. RW-SUP1 will be installed in an area of historically high silting, while RW-SUP2 will be installed in an area of moderate silting.

The two recovery wells will be installed in 12-inch boreholes, which will be advanced using rotosonic drilling methods in accordance with the Supplemental Pilot Study Work Plan. A 2-inch type 304 stainless well will be constructed in the borehole with a 5-foot screened section of 0.010 continuous wrap stainless steel. The recovery wells will be completed as described in the Supplemental Pilot Study Work plan. All soils will be containerized in drums and labeled. Detrex will coordinate the temporary storage and disposal of the generated drums. URS estimates that ten drums of soil will be generated during the drilling process. All drilling equipment including augers, split spoons and other tools in contact with subsurface materials will be decontaminated with a high pressure steam cleaning unit. All decontamination water will be collected in a portable decontamination unit supplied by the drilling company and disposed through the Detrex DNAPL recovery and treatment system.

Recovery Well Development

Following installation, the recovery well will be developed by the drilling contractor by removing up to 10 well volumes of water. URS will measure water quality parameters following each well volume removed. Water quality parameters to be measured include pH, conductivity, temperature and turbidity. Development will continue until 10 well volumes are removed or until three consecutive readings of the water quality parameters are stabilized to within 5%. All purge water will be disposed of through the Detrex DNAPL recovery and treatment system.

Pump Installation and Report

Following the installation of the two recovery wells, URS will install a recovery pump in each of the two recovery wells. The pumps to be installed will be a positive displacement piston pump, Trident Pump Model DT01, manufactured by Blackhawk Company, unless otherwise specified by Detrex and approved by USEPA.

URS will install the pump controllers in the nearest pump house and extend an air line to each of the recovery pumps. The fluid discharge line from the newly installed recovery pumps will be installed by Detrex, with assistance from URS if requested.

Following the installation of the recovery wells and pumps, a summary report documenting field activities, including recovery well installation logs, a location map and as-built drawings will be prepared and submitted to USEPA for approval.

SCHEDULE

Detrex is prepared to initiate activities upon USEPA approval to proceed. Drilling activities will commence as soon as possible (weather permitting) of notice to proceed, depending on the driller's availability. The recovery pumps will be installed as soon as possible (weather permitting) of the completion of the recovery wells, depending

on the delivery lag time for the pumps. The field activities report will be submitted to USEPA within 30 days of completion of field activities. If you have any comments or additional concerns, do not hesitate to contact me.

Sincerely,

Thomas W. Steib
Detrex Corporation

cc: Keith Mast – URS Corporation
Doug Church
Bob Currie
Tom Doll
Jim Vence
Keith Buell

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Acronym	Description
COC	Chemical of Concern
LNAPL	Light Non Aqueous Phase Liquid
MCL	Maximum Contaminant Level
MSL	Mean Sea Level
POC	Point of Compliance
SVOC	Semi-Volatile Organic Compound
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WWTP	Waste Water Treatment Plant

This Monitoring Plan has been prepared in response to the USEPA letter titled *Technical Support Issues Concerning the Addition of Experimental Extraction Wells and Site O&M, Detrex Source Control Area; Fields Brook Superfund Site* dated March 22, 2005. Specifically, this monitoring plan addresses USEPA comments on the December 12, 2004 updates to the monitoring section of the Operation and Monitoring (O&M) plan for the Detrex Facility.

1.1 BACKGROUND INFORMATION

Detrex Corporation (Detrex) operates a facility at 1100 North State Road in Ashtabula, Ohio. The general location of the Detrex Facility is provided in Figure 1-1. On February 26, 1998, the United States Environmental Protection Agency (U.S. EPA) issued a *Unilateral Administrative Order* (UAO) and a *Scope of Work for Remedial Design and Remedial Action for the Detrex Source Area* (the UAO SOW) requiring that Detrex develop plans and specifications for remedial measures at the facility.

The Phase I Remedial Investigation/Feasibility Study (RI/FS) Source Control environmental assessment investigations identified an area in the northeast corner of the Detrex Facility where soil and groundwater have been impacted by chlorinated volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). Soil borings and monitoring wells in this area have also identified a dense, non-aqueous phase liquid (DNAPL) layer that contains these VOCs and SVOCs. The area was formerly occupied by a series of settling ponds that were taken out of service and backfilled with soil. The former ponds were associated with manufacturing operations that have been discontinued at this facility.

Technical Memorandum 3 (W-C, May 1997) included a Feasibility Study that identified several conceptual remedial alternatives for the Detrex site. The U.S. EPA selected Alternative No. IV in the Source Control Record of Decision (ROD) issued September 1, 1997, to address the environmental conditions identified at the facility and prevent recontamination of sediment within Fields Brook. Alternative No. IV included:

- A downgradient vertical barrier wall (slurry wall);
- A groundwater collection trench upgradient of the slurry wall;
- A groundwater collection trench beneath the DS Tributary;
- Removal of sediments from the northern drainage ditch;
- Regrading activities in the northeastern portion of the property;
- Removal of the catalyst pile materials; and,
- Installation of a DNAPL recovery system.

Each of the action items, with the exception of the DNAPL recovery system, was addressed in the *Plans and Specifications for Remedial Design/Remedial Action* dated February 17, 2000. A *Remedial Action Work Plan* for those activities was issued on August 28, 2000 and work was initiated in September 2000. The slurry wall, collection trenches, sediment excavation, site grading and catalyst pile removal were completed in March 2001.

The *Plans and Specifications for DNAPL Recovery System* was issued at the 100 percent level on April 13, 2001. As agreed with USEPA, 12 of the 36 proposed recovery wells were installed in order to evaluate the DNAPL recovery system design as a pilot study prior to full-scale implementation. Construction of the pilot DNAPL recovery system was completed in October 2002. A layout of the site and existing features are presented on the Site Features Map on Figure 1-2.

A Supplemental Pilot Study Work Plan was prepared in response to an October 12, 2004 Comment Letter from USEPA concerning operation and maintenance (O&M) issues encountered during operation of the DNAPL pilot recovery system installed at the Detrex Facility. Detrex has proposed the installation of two "experimental" wells to evaluate potential alternative designs in response to the operation and maintenance issues that had been identified with the DNAPL recovery system. It is anticipated that the experimental wells will be installed during summer 2005.

The supplemental Pilot Study Work Plan addressed USEPA Comment 1 through Comment 7 of the October 12, 2004 USEPA comment letter. USEPA Comment 8, which specifically addressed the monitoring plan for the Detrex Facility, was addressed in a separate submittal provided to USEPA by Detrex on December 12, 2004. Additional comments on the monitoring plan were provided by USEPA to Detrex on March 22, 2005. This plan has been prepared in response to the March 22, 2005 comments.

A copy of the USEPA correspondence, including the March 22, 2005 comment letter, the October 12, 2004 comment letter, as well as the November 12, 2004 Detrex response to USEPA concerns and the December 12, 2004 submittal is provided in is provided in Appendix A of this monitoring plan.

1.2 SITE GEOLOGY AND HYDROGEOLOGY

Soil types within the southern half of the Detrex Plant property belong to the Conneaut Soil Series, according to the "Soil Survey of Ashtabula County" published by the Ohio Department of Natural Resources in May 1973. The Conneaut soils occur on nearly level land and are poorly drained. Due to their poor drainage and slow permeability, these soils exhibit seasonal wetness for long periods of time. The portion of the property in and around the manufacturing plant is described as "made land" due to the disturbance of the soils. This area contains a considerable amount of earth fill with the original soils being greatly altered or disturbed for construction of buildings, tanks, roadways, etc.

The topography of the site is relatively flat except for the southern boundary near Fields Brook. Surface water in the northwestern portion of the property drains north to northwest.

The geology of the site consists of 4 to 6 ft. of mottled silty clay with trace sand and 4 to 7 ft of a unit described as silt-sand-clay mixture; interbedded silt, sand and clay; a loamy silty clay with trace sand; or laminated silt and clay with trace sand. Beneath the second unit is 20 to 25 ft of gray, hard, often dry silty clay (Ashtabula Clay) with trace sand and gravel and shale fragments. Shale bedrock occurs approximately 40 ft below the ground surface (bgs). Laboratory testing of the subsurface materials indicates a very low permeability due to the high percentage of clay and

silt size particles. The silty clay and clayey silt deposits were found to have a coefficient of permeability ranging from 2 x 10^{-6} cm/sec to 9 x 10^{-8} cm/sec.

The top of the Ashtabula Till Clay is generally encountered at approximately 15 to 25 feet below ground surface across the site. A topographical high was observed in the Ashtabula Clay along the southern border of the Detrex property. Areas north of the topographical high slope generally to the north to northwest towards state road and areas south of the topographic high slope to the south towards Fields Brook. A north-south geologic cross-section developed during the Fields Brook Phase I SCRI is presented on Figure 1-3.

The groundwater flow direction in the shallow water bearing zone shows a similar flow pattern across the site. The area along the southern border of the site migrates south towards Fields Brook. Groundwater across the remainder the site flows north to north/northwest toward the DS tributary bordering the site to the north. A groundwater contour map formerly presented in the URS' Remedial Design Workplan, dated January 8, 1999 is presented on Figure 1-4.

1.2.1 Development of Monitoring Well Network

A monitoring well network was developed to allow Detrex to assess the effectiveness of the remedial systems currently operating on the Site. The remedial systems consist of a slurry wall along the northwest corner of the property: a groundwater collection system located along the upgradient (east side) of the slurry wall; and a pilot DNAPL vacuum enhanced recovery system located along the north center property border. A general layout of the remedial systems is presented on the Site Features Map (Figure 1-2).

1.2.1.1 Dissolved plume

As previously discussed, groundwater across the site generally flows towards the northwest. A topographic high in the groundwater flow direction occurs along the southern border of the property. The dissolved plume is expected to flow in the same direction as the groundwater flow direction. The slurry wall, groundwater recovery trench, and the DS interceptor trench were designed to prevent dissolved phase contaminants and DNAPL from migrating offsite and discharging to the DS tributary. Which is located on the northwest corner of the Site.

The monitoring well network should provide background data and data necessary to show that the dissolved plume is not migrating from the site. The network should contain monitoring wells upgradient and downgradient of the plume.

Upgradient

Due to the topographic high area in the groundwater flow direction, few monitoring wells are in a true upgradient direction. Monitoring wells DET02S, DET11S, DET17S, and DET18S are located upgradient and side gradient of the DNAPL and dissolved phase plume. Monitoring well DET17S is located on the southern side of the groundwater divide. Groundwater data from DET17S will provide background concentrations and show whether dissolved phase contaminants or DNAPL are migrating to the south from the DNAPL source area across the divide. DET18S provides control in the eastern upgradient direction. DET02S and DET11S provide side gradient control in the western direction.

Downgradient

Monitoring points are necessary down gradient of the DNAPL plume to assess migration of the dissolved phase plume. Additionally, the downgradient monitoring points are utilized to assess the potential migration of DNAPL from the main source area. Monitoring wells located down gradient of the DNAPL plume include DET-04S, DET-20S, DET-21, RMI 1-S and RMI 2-S. Monitoring wells DET01S and RMSMW05S appear to have been destroyed.

Monitoring Well DET04S is located immediately downgradient of the DNAPL plume within the dissolved plume. It will be utilized to assess the dissolved plume concentrations immediately upgradient of the slurry wall and groundwater collection trench. DET-21 is located on the downgradient side of the slurry wall and will be utilized to assess potential breakthrough of dissolved contaminants or DNAPL.

1.2.1.2 DNAPL

The DNAPL pilot recovery system was designed to reduce the quantity of DNAPL and to prevent the migration of DNAPL from the Site.

Due to the presence of DNAPL at the site, density flow, as well as, advective flow must also be considered in the design of the monitoring well network. The maximum areal extent of DNAPL is shown on Figure 1-2. The DNAPL flow direction is expected to follow (via density flow) the slope direction of the top of the Ashtabula Clay Till. The Ashtabula Clay Till shows a topographic high area along the southern portion of the property. The slope is generally to the north/northeast and south of this high area. Monitoring well DET-10S is located just north of the topographic high area. All wells showing measurable levels of DNAPL are located north of the topographic divide.

The DNAPL thickness and migration will be evaluated by measuring DNAPL in monitoring within the plume and immediately downgradient of the plume and upgradient of the plume. Additionally, monitoring wells located upgradient and side gradient will also be measured for the presence of DNAPL during the semi-annual sampling events. If monitoring wells become damaged or inaccessible due to unforeseen conditions, Detrex will notify the USEPA.

- Monitoring wells within the DNAPL plume include:
    - DET05S,
    - DET06S
    - DET07S,
    - DET08S
    - DET09S, and
    - DET010S.

- Monitoring wells located immediately downgradient of the DNAPL plume include:
  - DETMW-04S
  - DETMW-20S,
  - RMI-1S,
  - RMI-2S,
- Monitoring wells located immediately upgradient of the DNAPL plume include:
  - DETMW-17S
  - DETMW-18S
  - DETMW-11S
  - DETMW-02S

1.3 ORGANIZATION

This report is organized into 5 sections. Section 1.0 is the introduction. Section 2.0 provides the objectives and approach for the PBGM plan. Section 3.0 presents the field procedures for sample collection. Section 4.0 describes the groundwater monitoring reporting requirements. Section 5.0 lists the references utilized in the production of this document.

2.1 OBJECTIVES

The objective of the recovery system and groundwater monitoring at the Detrex Facility is to assess the effectiveness of the DNAPL recovery system, as well as the slurry wall, groundwater recovery trench, and the DS Tributary Interceptor Trench. Groundwater monitoring data will also be utilized to demonstrate that the DNAPL plume is stable or reducing in aerial extent. The results of the monitoring program will be utilized to demonstrate that the site groundwater and DNAPL plume are not potential sources of contamination to Fields Brook or its tributaries.

Monitoring activities include collection of groundwater samples, measurement of the thickness of the DNAPL within the area of the plume, inspection of the stormwater collection sump, inspections of the DNAPL recovery system, and vapor emissions sampling.

2.2 RECOVERY SYSTEM MONITORING

2.2.1 Inspections

The DNAPL system will be operated during working hours. Flow totalizer and DNAPL volumes will be estimated and recorded daily and documented by Detrex personnel. System maintenance personnel will prepare maintenance and inspection reports for the DNAPL Recovery System. These reports will be archived in the project file and stored at the Detrex central file location for no less than three years.

2.2.2 Vapor Emissions Sampling

Vapor emissions are continuously monitored via an in line indicator. All vapors are exhausted through at least two carbon canisters that are installed in series. When the first in line indicator fails, a new container is installed as the second container in the series and the previous second container becomes the first container. This process is repeated every time the in line indicator turns color showing the activated carbon is spent.

2.2.3 DNAPL Thickness Monitoring

Groundwater elevations and DNAPL thickness will be measured from monitoring wells located within the estimated aerial extent of the DNAPL plume and immediately down gradient of the plume on a quarterly basis. Additionally, monitoring wells located outside DNAPL plume will be inspected for the presence of DNAPL during scheduled groundwater sampling events. Wells to be monitored include:

- DETMW-02S,
- DETMW-04S,
- DETMW-05S,
- DETMW-06S,

- DETMW-07S,
- DETMW-08S,
- DETMW-09S,
- DETMW-10S,
- DETMW-17S,
- DETMW-18S,
- DETMW-20S,
- DETMW-21,
- RMI-1S, and
- RMI-2S.

In order to prevent cross contamination, DNAPL thickness monitoring will be completed utilizing dedicated equipment within the established perimeter of the DNAPL plume. The dedicated equipment will not be used to measure water levels outside this area. Visual measurements will be made utilizing a disposable one time use bailer.

2.3 SLURRY WALL, GROUNDWATER RECOVERY & DS INTERCEPTOR TRENCHS

2.3.1 Inspections

The stormwater collection sump will be inspected quarterly for flow. Additionally, the cleanouts will be inspected quarterly for physical damage. System maintenance personnel will prepare maintenance and inspection reports for the stormwater collection sump inspection. These reports will be archived in the project file and stored at the Detrex central file location for no less than three years.

2.4 GROUNDWATER MONITORING

Groundwater samples will be collected to assess the extent of the dissolved phase plume, as well as the performance of the slurry wall, the groundwater recovery trench, and the DS Tributary interceptor trench. Groundwater levels and DNAPL thickness will be measured on a quarterly basis. In order to prevent cross contamination, groundwater levels will be measured utilizing dedicated equipment. Equipment used to measure DNAPL thickness within the plume area will not be used to measure water levels outside the DNAPL plume area. Groundwater samples will be collected on a semi-annual basis.

2.4.1 Analytical Methods

Samples will be analyzed for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) via Methods SW846-8260 and SW846-8270, respectively. Samples will be analyzed by Firstech of Cleveland, OH.

2.4.2 Monitoring Well Network

In order to assess the presence and concentrations of the COCs in groundwater, seven monitoring wells will be sampled during each quarterly groundwater monitoring event. The locations of the monitoring wells are presented in Figure 1-2. Groundwater samples will be collected from selected monitoring wells located both upgradient and downgradient of the slurry wall, as well as along the western and southern edges of the DNAPL plume.

The following wells will be included in the monitoring well network for monitoring the performance of the slurry wall, groundwater recovery trench, and the DS interceptor trench, and the DNAPL recovery system:

Upgradient

- DETMW-11S
- DETMW-17S
- DETMW02S
- DETMW-18S

Downgradient

- DETMW-21 (down gradient of slurry wall)
- DETMW-20 (eastern extent of DS interceptor trench)
- DET-04S (within dissolved plume)

2.4.3 Data Validation

Upon completion of each sampling event, a standard data quality review will be completed to ensure that the data is useable for the purpose for which it was intended. A standard data quality review includes assessment of supporting quality control (QC) elements such as laboratory blanks, laboratory control samples, surrogates, sample duplicates, and matrix spikes, as well as holding times, detection limits, dilution factors, and information provided in the report narrative. A standard review does not include evaluation of instrument performance and calibrations or reconstruction of the analytical data.

2.5 GROUNDWATER & RECOVERY SYSTEM DATA EVALUATION

In order to demonstrate that the slurry wall, collection trenches and the DNAPL removal system are effective in preventing site groundwater and DNAPL from impacting Fields Brook or its tributaries, analytical data will be reviewed after each event to ensure that there are no uncontrolled releases from the site, i.e. none of the COCs have demonstrated significant increases in concentration over historical data. As part of this review, product thickness and groundwater flow direction will be assessed and evaluated to ensure that the data supports the functionality of the system, i.e. groundwater flow direction is consistent with historical records and that DNAPL thickness in the vicinity of the recovery system is stable or decreasing.

After five years of groundwater sampling, a review will be made of the analytical results and the sampling program may be modified if results indicate that concentrations are stable or

decreasing. An appropriate statistical method such as the Mann-Kendall trends test will be utilized to determine whether the data is demonstrating stable or decreasing concentrations of COCs when compared to historical data. Since the distribution of the data is not currently known, the selection of an appropriate statistical method will not be made until all the data has been collected.

Additionally, trends in DNAPL recovery and DNAPL system recovery operational trends will be evaluated to assess the effectiveness and continued operation of the DNAPL recovery system.

3.1 GROUNDWATER MONITORING

All groundwater samples will be collected using disposable, high-density polyethylene bailers. This technique involves sampling groundwater by purging the well by lowering the bailer into the water column and removing groundwater from the well until the water quality have stabilized.

The following information will be recorded in the field log book at each groundwater sampling location:

- Date and time,
- Barometric conditions, temperature, and general weather conditions,
- Depth to water measured from the surveyed top of the well casing,
- Depth to the top of DNAPL (if any), and
- Depth to bottom of well measured from the surveyed top of the well casing.

A standard electronic water level indicator will be used to take the measurements for locations located outside of the DNAPL plume area. Additionally, the wells will be measured in order from least impacted to most impacted. This determination shall be made based on the most current groundwater analytical results. The water level indicator will be decontaminated between each well as specified in Section 3.2.

DNAPL measurements will be collected utilizing a dedicated interface probe, which is capable of measuring the top of the water column, as well as, the top of the DNAPL layer (if present). Due to the difficulty in adequately decontaminating the interface probe, it will only be used in monitoring wells that routinely contain DNAPL. Monitoring wells located outside the DNAPL plume area will be assessed for the presence of DNAPL by lowering a bailer to the bottom of the well during each quarterly sampling event. Visual observations will be recorded in the field log book.

On the basis of the above measurements and well diameter, the volume of water standing in each well will be calculated. Well purging will be conducted by lowering the dedicated one-time use HDPE bailer into the well. Prior to initiating the well purging and after each well volume, the discharge water will be measured for specific conductance, pH and temperature. All purge water will be containerized and disposed of through the Detrex water treatment system in accordance with federal, state and local regulations.

Sampling will commence after at least three well volumes have been purged or parameters (temperature, pH, and specific conductance) have stabilized (defined as 10 percent or less parameter fluctuation between two successive measurements). If the well is purged to dryness or is purged such that the full recovery period exceeds 2 hours, the well will be sampled as soon as sufficient volume of groundwater has accumulated in the well to allow the collection of the necessary groundwater samples.

Sampling will be performed using the same equipment as that used for purging. All field measurements will be documented in the field logbook.

- At each location, groundwater samples will be collected for VOCs and SVOCs, as required,
- After the groundwater parameters have stabilized or after a minimum of three well volumes have been purged from the well, samples will be directly poured into laboratory supplied glassware.
- Samples will be immediately placed in an iced cooler and maintained at a temperature of 4 degrees Celsius or lower, without freezing until they are delivered to Firstech Laboratories of Cleveland, Ohio under standard chain-of-custody protocol.

With the exception of the detergent that will be used for the initial cleaning, the solutions used to decontaminate the field equipment will not be re-used. All spent solutions will be containerized and disposed of through the Detrex water treatment system in accordance with federal, state and local regulations. Disposable equipment will be contained in a plastic garbage bag for disposal as solid waste.

3.2 DECONTAMINATION PROCEDURES

All sampling equipment to be utilized will be one time use and will be disposed of following use at each well. The water level indicator and the interface probe require decontamination prior to use at each location. The entire length of cable that comes into contact with groundwater or DNAPL will be decontaminated in the following manner:

- The equipment will be rinsed with clean potable water,
- Followed by an Alconox/water solution rinse;
- Followed by a deionized water rinse.

If DNAPL is encountered the equipment will be rinsed with Methanol following the Alconox/ water solution rinse.

3.3 SAMPLE IDENTIFICATION

All analytical samples will be assigned a unique sample identifier. The identifier will be comprised of the following information:

- Sample Location (monitoring well identification number, (i.e., DETMW-04S),
- Sample date , and
- Sample type (Environmental, Replicate, or Trip Blank).

3.4 SAMPLE HANDLING AND PACKING

Samples will be collected in order and containerized according to the volatility of the target analytes. The collection order for the analytes is as follows (where applicable):

- Volatile organics (VOAs or VOCs)
- Semivolatile organics (SVOCs)

Immediately following collection, samples will be placed in iced, insulated coolers. Samples will be packed in bubble wrap or equivalent material, placed in iced, insulated coolers and shipped to the approved laboratory via overnight courier. Proper chain of custody will be maintained during sample handling and shipping activities.

3.5 QUALITY ASSURANCE/QUALITY CONTROL

QC samples will be collected at the following frequencies:

- Field Duplicates (D) – One (1) per 10 environmental samples collected or a minimum of one per sampling event,
- Field Blank Samples (B) – One (1) per 20 environmental samples collected,
- Trip Blank Samples (TB) – One (1) trip blank will be included in each cooler containing aqueous samples for VOC analysis,
- Organic Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples – One (1) per 20 environmental samples collected, and
- Inorganic Matrix Spike/Laboratory Duplicate (MS/LD) Samples – One (1) per 20 environmental samples collected.

3.6 EQUIPMENT CALIBRATION

Instruments used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. Field measurement instruments will include one or more of the following: multi-parameter meter, pH meter, specific conductance meter, thermometer (or temperature probe), and electronic water-level indicator. As a rule, each field measurement instrument will be calibrated daily prior to use and the calibration checked every 15 samples.

Calibration procedures will be documented in the field records. Documentation will include the date and time of calibration, the identity of the person performing the calibration, the reference standard used, the readings taken, and any corrective action.

3.7 SAMPLE CONTAINER, PRESERVATION AND HOLDING TIME REQUIREMENTS

The following table presents the sample container, preservation and holding time requirements:

Analysis Method	Sample Container	Preservative	Holding Time
SW846-8260B (VOCs)	Three 40-ml glass vials with teflon-lined caps	No headspace HCL to pH<2 Ice (4°C)	14 days from time of collection
SW846-8270C (SVOCs)	Two 1-liter amber glass bottles with teflon-lined caps	Ice (4°C)	7 days from time of collection

4.1 QUARTERLY STATUS REPORTS

Quarterly status reports will be prepared and submitted to USEPA. The quarterly reports will summarize the following:

- DNAPL thickness monitoring,
- Groundwater levels,
- DNAPL volume recovered,
- Groundwater monitoring results,
- Data review results, and
- Schedule.

Detrex will retain these records for no less than three years.

4.2 GROUNDWATER SAMPLING REPORTING

The results of the groundwater monitoring will be summarized in the quarterly status report following the receipt and review of the data. The groundwater monitoring summary will include the following items, as appropriate:

- Figure presenting locations of monitoring wells
- Sampling dates
- Summary of groundwater level and DNAPL thickness readings from two proceeding quarterly events
- Groundwater contour map
- Summary of analytical results
- Results of statistical analysis, if completed

The summary report will be submitted to USEPA within 45 days of receipt of laboratory data. Detrex will retain these records for no less than three years.

Woodward-Clyde, 1994, Fields Brook Phase I SCRI, Figure 4.3.7.

Woodward-Clyde, November, 1995, Phase I Source Control Remedial Investigation Report.

Woodward-Clyde, December 1995, Comment Response Report Detrex Facility, Ashtabula, Ohio.

Woodward-Clyde, January 8, 1998, Remedial Design Workplan, Detrex Corporation, Ashtabula, Ohio.

URS Greiner Woodward-Clyde, January 11, 2000, Final Design North Sewer Source Area, Fields Brook Superfund Site, Ashtabula Site, Ashtabula, Ohio.

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ACGIH	American Conference of Governmental Industrial Hygienists
analyzer	refers to the field instrument described in Section 6.1
atm	atmosphere
°C	centigrade
Carcinogen	a substance that can cause cancer
cc	cubic centimeter
CGI	Combustible Gas Indicator
CM	Construction Manager
CNS	Central Nervous System
CMS	Corrective Measures Study
COC	Chemicals of Concern
DERA	Detailed Ecological Risk Assessment
eV	Electron Volts
°F	Fahrenheit
HHRA	Human Health Risk Assessment
HSP	Health and Safety Plan
IM	Interim Measure
kg	kilogram
LTU	Land Treatment Unit
LEL	Lower Explosive Limit
Lpm	liters per minute
MCS	Media Cleanup Standard
MSDS	Material Safety Data Sheet
m	meter
mg	milligram
mg/M^3	milligrams per cubic meter
ml	milliliter
mm	millimeter
ND	not detected
NIOSH	National Institute for Occupational Safety and Health

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Glossary of Terms, Acronyms and Abbreviations

OBZ	operator's breathing zone
OEL	occupational exposure limit
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PM	Project Manager
ppb	parts per billion
ppm	parts per million
QAPP	Quality Assurance Project Plan
REL	Recommended Exposure Limit
RHSM	Regional Health and Safety Manager
SMS	Safety Management Standard
SSO	Site Safety Officer
SSR	Subcontractor's Safety Representative
STEL	Short Term Exposure Limit
SWMUs	Solid Waste Management Units
TIR	Thermal Infrared Radiation
TLV	Threshold Limit Value
TCLP	Toxicity Characteristic Leachate Procedure
UEL	Upper Explosive Limit
URS	URS Corporation and Subsidiaries
VOC	Volatile Organic Compound
VCA	Voluntary Corrective Action
WWTP	Waste Water Treatment Plant

SITE SPECIFIC HEALTH & SAFETY PLAN
DETREX CORPORATION
1100 STATE ROAD
ASHTABULA, OHIO

APRIL 2005

William Mello	Date
Health & Safety Plan Preparer	
Jim Anderson	Date
Project Manager	
Cece Weldon, CHMM, ASP	Date
Regional Manager of Health and Safety	

THIS HSP IS TO BE USED FOR THE SPECIFIC PROJECT DESCRIBED HEREIN. IT IS NOT TO BE USED FOR ANY OTHER PROJECT. THIS HSP WILL BE REVIEWED AND UPDATED BY THE HEALTH AND SAFETY MANAGER A MINIMUM OF 1 YEAR FROM THE PREPARATION DATE OR AS SITE CONDITIONS OR PROJECT REQUIREMENTS CHANGE.

This Health and Safety Plan has been prepared by URS Corporation for the purpose of aiding in the activities associated with the Detrex facility in Ashtabula, Ohio. The limited objectives of this plan, along with the evolving conditions and chemical effects on the environment and health, must be considered when evaluating this plan since subsequent facts may become known that may make this plan premature or inaccurate. Acceptance of this plan in performance of the contract under which it is prepared does not mean that the Detrex Corporation adopts the conclusions, recommendations, or other views expressed herein, which may not necessarily reflect the official position of the Detrex Corporation.

The purpose of this Health and Safety Plan (HSP) is to set forth, in an orderly and logical fashion, appropriate health and safety procedures to be followed during activities associated with activities scheduled at the Detrex Corporation. The scope of this HSP will include the methods and procedures that will be followed during soil boring activities and the installation of groundwater monitoring/remediation wells.

This document will serve not only to explain the chemical and physical hazards associated with working on the Project, but will also outline approved measures for dealing with such hazards. Air monitoring procedures for airborne contaminants are also explained in this HSP.

The procedures presented in this plan comply with the following regulatory or guidance documents:

- NIOSH/OSHA/USCG/USEPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, October 1985.
- OSHA Occupational Safety and Health Standards for Hazardous Waste Operations and Emergency Response, 29 CFR 1910.120, August 22, 1994.
- Standard Operating Safety Guides, United States Environmental Protection Agency, Office of Emergency and Remedial Response, November 1984.
- USEPA Order 1440.2, Health and Safety Requirements for Employees Engaged in Field Activities, July 12, 1981.

All personnel involved in onsite activities under this Health and Safety Plan will be required to follow the HSP protocols, as directed by the Site Safety Officer (SSO). In addition, the subcontractor(s) will be required to designate a SSO for their personnel and to follow, at a minimum, the requirements of this HSP.

All URS personnel who will be involved in intrusive activities onsite have completed the appropriate waste site worker training as required by OSHA 1910.120(e)(2), 1910.120(e)(3), and 1910.120(e)(8), as applicable, and the required medical surveillance as required by OSHA 1910.120(f). URS personnel working in Level B PPE will provide a copy of the Level B training certificate. Copies of training certificates and medical surveillance certification for all URS field personnel will be maintained onsite.

2.1 HISTORICAL BACKGROUND

Fields Brook (the stream itself) drains a 5.6-square-mile watershed. The eastern portion of the watershed drains Ashtabula Township and the western portion drains the eastern section of the City of Ashtabula. Fields Brook has several tributaries, including the DS, Detrex and Route 11 tributaries.

During the 1970's and early 1980's, biota, sediments and surface water samples were collected from Fields Brook and analyzed. These investigations noted the presence of a number of priority pollutant compounds in the sediment, surface water, and fish from Fields Brook and the Ashtabula River below its confluence with Fields Brook. The presence of these pollutants was attributed to past operations performed at industrial facilities located along Fields Brook. Detrex Corporation (Detrex) was one of the facilities identified as a contributor to the Fields Brook contamination. Subsequent to the findings of these investigations, Fields Brook was placed on the National Priority List (NPL) of uncontrolled hazardous waste sites.

2.2 SITE DESCRIPTION AND CORRECTIVE MEASURES

During the 1980's, Detrex performed several subsurface investigations on its property to delineate areas of contamination that contributed to the contamination found in Fields Brook. These investigations indicated the presence of Dense Non-Aqueous Phase Liquids (DNAPL) located in the soil and groundwater underlying the Site.

During the 1990's, Detrex performed investigations of its property to define the areal extent of contamination and to identify remedial alternative applicable to addressing these sources of recontamination to the Fields Brook. Work conducted during the 1992 Source Control investigation at Detrex identified soil contamination, groundwater contamination, and the presence of dense, non-aqueous phase liquid (DNAPL). Work conducted in 1997 identified the presumed extent of the DNAPL layer and contaminated groundwater. Based on these investigations, it was determined that the installation of low permeability barrier wall and DNAPL collection system would protect against recontamination of Fields Brook. The low permeability barrier wall was installed during 2000. A DNAPL collection system was subsequently installed at the site.

URS will have site safety and health oversight and coordination responsibilities for URS personnel; each subcontractor will be held accountable for the safe and healthful performance of work by each of their employees, subcontractors, or support personnel who may enter the site.

URS will strictly adhere to the provisions of this health and safety plan, along with the applicable regulations issued by governmental entities. The Project Manager (PM), Site Safety Officer (SSO) and the Regional Health and Safety Manager (RHSM) will be provided with copies of this HSP.

3.1 PROJECT MANAGER (JIM ANDERSON)

The PM shall direct URS onsite operations. The PM may delegate all or part of these duties to a properly qualified URS employee. At the site, the PM, assisted by the SSO, has primary responsibility for:

- Seeing that appropriate personal protective equipment and monitoring equipment is available and properly utilized by all onsite URS employees.
- Establishing that URS personnel are aware of the provisions of this plan, are instructed in the work practices necessary to ensure safety, and are familiar with planned procedures for dealing with emergencies.
- Establishing that all URS onsite personnel have completed a minimum of 40 hours of health and safety training and have appropriate medical clearance as required by 29 CFR 1910.120, and have been fit tested for the appropriate respirators.
- Seeing that URS personnel are aware of the potential hazards associated with site operations.
- Monitoring the safety performance of all URS personnel to see that the required work practices are employed.
- Correcting any URS work practices or conditions that may result in injury or exposure to hazardous substances.
- Preparing any accident/incident reports for URS activities (URS Incident Report Form 49-1 located in Appendix D).
- Seeing to the completion of Plan Compliance Agreements by URS personnel (See Appendix E).
- Halting URS site operations, if necessary, in the event of an emergency or to correct unsafe work practices.
- Seeing that utility clearances are obtained, confirmed, and documented prior to the commencement of work.
- Seeing that the appropriate Safety Management Standards are appended to this HSP and are available on site.
- Reviewing and approving this project health and safety plan.

3.2 SITE SAFETY OFFICER (BILL CLAYTON)

The Site Safety Officer's (SSO) duties may be carried out by the PM or other qualified URS site manager. The SSO is responsible for:

- Implementing project Health and Safety Plans, and reporting any deviations from the anticipated conditions described in the plan to the PM, and, if necessary, the RHSM.
- Determining that monitoring equipment is used properly by URS personnel and is calibrated in accordance with manufacturer's instructions or other standards, and that results are properly recorded and filed.
- Check with Health and Safety Representative to assure URS personnel have current HAZWOPER medical clearance and training.
- Assuming any other duties as directed by the PM or RHSM.
- Coordinating with URS Health and Safety Professional to identify URS personnel on site for whom special PPE, exposure monitoring, or work restrictions may be required.
- Conducting daily safety meetings for all site personnel in accordance with Section 13.
- Conducting daily site inspections prior to the start of each shift. All inspections must be documented (preferably in a bound field logbook).
- Providing ongoing review of the protection level needs as project work is performed, and informing the PM of the need to upgrade/downgrade protection levels as appropriate.
- Seeing that decontamination procedures described in Section 10.0 are followed by URS personnel.
- Establishing monitoring of URS personnel and recording results of exposure evaluations.
- Halting URS site operations, if necessary, in the event of an emergency or to correct unsafe work practices.
- Maintaining the visitor log.
- Posting OSHA "Safety of the Job" and other required posters at the site.

3.3 REGIONAL HEALTH AND SAFETY MANAGER (CECE WELDON, CHMM, ASP)

The RHSM is responsible for:

- Determining the need for and conducting periodic audits of the operation to evaluate compliance with this plan.
- Providing health and safety support as requested by the SSO and PM.
- Reviewing and giving final approval to this HSP.
- Removal and replacement of personnel working in an unsafe manner in conjunction with the PM.
- Reviewing any addendum or alterations of this HASP.

3.4 PROJECT PERSONNEL (BILL CLAYTON)

Project personnel involved in onsite investigations and operations are responsible for:

- Taking all reasonable precautions to prevent injury to themselves and to their fellow employees.
- Performing only those tasks that they believe they can do safely, and immediately reporting any accidents and/or unsafe conditions to the SSO or PM.
- Implementing the procedures set forth in the Health and Safety Plan, and reporting any deviations from the procedures described in the Plan to the SSO or PM for action.
- Notifying the PM and SSO of any special medical problems (i.e., allergies) and seeing that all onsite URS personnel are aware of such problems.
- Reviewing project health and safety plan and signing Safety Plan Compliance Agreement.

3.5 SUBCONTRACTOR'S SAFETY REPRESENTATIVE

Each subcontractor is required to designate a Subcontractor's Safety Representative (SSR) who is the subcontractor supervisor. The SSR is responsible for the safe and healthful performance of work by his work force and subcontractors. During subcontractor activities onsite, the SSR will perform continuing work area inspections, and conduct safety meetings and safety orientations for all new employees. The SSR will attend periodic safety meetings with the SSO. The SSR will also investigate accidents and exposures involving subcontractor personnel.

5.1 CHEMICAL HAZARDS

Based on the investigations completed to date on the Detrex facility, a variety of organic compounds and metals have been identified in the soils, sediment and groundwater at the site that can potentially impact the Health and Safety of URS personnel. These include chloroform, hexachlorobenzene (HCB), hexachlorobutadiene, polychlorinated biphenyls (PCBs), 1,1,2,2-tetrachloroethane, tetrachloroethylene (PCE), 1,1,2-trichloroethane, trichloroethylene (TCE), and vinyl chloride; Hexachlorobutadiene has a very low threshold limit value, 0.02 ppm.

- Chloroform
- Hexachlorobutadiene
- Tetrachloroethene
- 1,1,2-Trichloroethane
- 1,1,2,2-Tetrachloroethane
- Vinyl Chloride
- Trichloroethene
- 1,1-Dichloroethene
- 1,1,1-Trichloroethane
- trans-1,2-Dichloroethene
- cis-1,2-Dichloroethene
- Hexachlorobenzene
- Polychlorinated biphenyls (PCBs)
- 1,1,1,2-Tetrachloroethane

The chemicals listed above are considered the Chemicals of Concern (COCs) for the site. The hazards associated with the COCs are listed in Appendix A. The risk of exposure to these chemicals can be by ingestion, dermal, or respiratory routes, depending on the type and concentration of compounds encountered during field activities. The information contained in Appendix A was taken from the *NIOSH Pocket Guide to Chemical Hazards* (US Department of Health and Human Services, 1997). Information from alternate sources was obtained for COCs not included in the NIOSH Pocket Guide to Chemical Hazards.

From an occupational health standpoint, given that any potential exposure to site personnel will be only for a ***short period of time (intermittent for several days),*** the levels of contaminants that have been, or could be, encountered during site activities ***should not represent a significant concern*** if the provisions of this HSP are appropriately implemented. However, ***the site is still operational,*** and DNAPL is present in the soil and groundwater, so the potential for exposure to elevated levels of these contaminants may exist. Overviews of the hazards associated with exposure to the chemicals that may pose a hazard during site activities are presented below in terms of the following types of occupational exposure limits:

PEL - Permissible Exposure Limit (OSHA Standard)

TLV - Threshold Limit Value (ACGIH Guidance)

REL - Recommended Exposure Limit (NIOSH Guidance)

STEL- Short Term Exposure Limit

C - Ceiling

OSHA Permissible Exposure Limits (PELs), ACGIH Threshold Limit Values (TLVs), and NIOSH Recommended Exposure Limits (RELs) are time-weighted averages (TWAs) defined as concentrations for a normal 8-hour work day and 40-hour work week to which almost all workers can be repeatedly exposed without suffering adverse health effects

Short Term Exposure Limit (STEL) is defined as the concentration to which workers can be exposed for short time periods without irritation, tissue damage, or narcosis sufficient to likely cause impairment of self-rescue or precipitate accidental injury. The STEL is a 15-minute time-weighted average that should not be exceeded at any time during the workday. STELs are used by OSHA, ACGIH and NIOSH for chemical exposure criteria.

A ceiling value (C) is a concentration that should not be exceeded at any time in any workday. Ceiling limits are used by OSHA, ACGIH and NIOSH for chemical exposure criteria.

Skin contact with potentially contaminated materials will be minimized by the use of personal protective clothing (as described in Section 7.0). Inhalation of vapors or particulates during the site activities will be minimized by air monitoring and the use of engineering controls, and respiratory protection will be used if Action Levels described in Section 9.0 are exceeded. Ingestion of contaminated materials will be minimized by the use of appropriate personal hygiene procedures during decontamination (i.e., thoroughly washing face and hands with soap and water after leaving the work area and prior to eating or drinking; and, no eating or smoking while in work area).

5.1.1 Hazard Communication Materials

Materials which are considered hazardous materials under the OSHA Hazard Communication Standard (29 CFR 1910.1200) may be used during this project. In accordance with the URS Hazard Communication Program, the MSDS for the hazardous materials will be stored at the site. The SSO will make copies of these MSDS available to any subcontractor on this project. Personnel with the potential to work with hazardous materials should be trained in accordance with URS SMS 002, *Worker Right to Know*. A copy of URS SMS 002 is included in Appendix B.

5.2 CONTROL OF EXPOSURE TO CHEMICALS HAZARDS

Potential hazards will be reduced by protecting against exposures to contaminants first by engineering and administrative controls or secondly by the utilization of appropriate PPE. The engineering and administrative controls to be implemented include:

Engineering Controls

- Using remote sampling devices such as tongs or shovels to avoid contact with contaminated media.
- The use of Rotosonic drilling methods will be used to control contact with contaminated particulates.
- Having the driller collect soil samples and containing them in zip-loc bags. URS personnel will observe the soil samples contained in zip-loc bags outside of the exclusion zone.

- Large, industrial-style fans may be used to help dissipate volatile contaminants from the breathing zone during the drilling activities in the exclusion zone (e.g. drilling and well installation). These fans will be placed upwind of the work area.

Administrative Controls

- A clean work surface will be maintained to avoid contact with contaminated media.
- Distance between worker and actual contaminated area (e.g., placing of heavy equipment on clean side during certain activities to provide some measure of remoteness of the operation).
- Staying upwind from contaminant emissions.
- Ensuring only essential personnel are in work area.

PPE to protect the body against contact with known or anticipated chemical hazards are divided into five levels of protection categories (i.e. Level A, B, C, Modified D, and D) according to the degree of protection afforded. The initial levels of personal protective equipment to be used while performing the work activities described in Section 1 are discussed in Section 7, *Initial Levels of Protection.* If the PPE for any level of protection needs to be modified to be appropriate for the specific hazard encountered, an appropriate Addendum to this HASP will be prepared by the URS RHSM, and approved by the RHSM.

Levels of protection can be upgraded by the URS SSO if they are not appropriate; downgrading of PPE requires approval by the URS RHSM.

5.3 PHYSICAL HAZARDS

Physical hazards at the surface range from the dangers of tripping and falling on uneven ground to those associated with the operation of heavy equipment such as cranes and backhoes. The following are physical hazards, which may be encountered during site activities.

5.3.1 Heat Stress Recognition and Control

Heat stress monitoring shall commence when personnel are wearing PPE, including Nomex or Tyvek®-type coveralls, and the ambient temperature exceeds 70°F. If standard work garments (cotton coveralls) are worn, monitoring shall commence at 85°F. The URS Standard Management Standard (SMS) 018, *Heat Stress*, included in Appendix B, will be implemented to address this hazard.

5.3.2 Cold Stress Recognition and Control

Protection against cold stress should be initiated when temperatures drop below 45°F.

Exposure to cold working conditions can result in cold stress (hypothermia) and/or injury (frostbite) to hands, feet, and head. Hypothermia can result when the core body temperature drops below 36°C (96.8°F). Lower body temperature will likely result in dizziness, drowsiness, disorientation, slurred speech, or loss of consciousness, with possible fatal consequences. Pain

the extremities may be the first warning of danger to cold stress. Shivering develops when the body temperature has fallen to 35°C (95°F).

Hypothermia can be brought on by exposure to cold air, immersion in cold water, or a combination of both. Wind chill factor, the cooling power of moving air, is a critical factor in cold stress.

Workers must wear adequate insulating clothing if work is performed in temperatures below 4°C (40°F). At temperatures of 2°C (35.6°F or less), workers whose clothing becomes wet should be immediately provided with a change of clothing, and if necessary, treated for hypothermia. Treatment includes warming the victim with skin-to-skin contact, or by providing warm blankets or other coverings, and drinking warm liquids. Skin exposure should not be permitted at temperatures of -32°C (-25°F) or below.

If fine work is to be performed with bare hands for more than 10-20 minutes at temperatures below 16°C (60°F), provisions should be made for keeping the workers' hands warm. If equivalent chill temperatures fall below 40°F and fine manual dexterity is not required, then gloves should be worn. Metal handles of tools should be covered with insulating material at air temperatures below -1°C (30°F).

If work is to be performed continuously in the cold when the wind chill factor is at or below -7°C (19°F), heated warming shelters (tents, trailers, vehicle cabs) should be made available nearby.

The URS Standard Management Standard (SMS) 059, *Cold Stress*, included in Appendix B, will be implemented to address this hazard.

5.3.3 Noise Hazards

Previous surveys indicate that equipment used for excavations may produce continuous and impact noise at or above the action level of 85 dBA. All URS personnel within 25 feet of operating equipment, or near an operation that creates noise levels high enough to impair conversation, shall wear hearing protective devices (either muffs or plugs). URS personnel who are in the Medical Surveillance program are automatically enrolled in the URS Hearing Conservation Program and have had baseline and, where appropriate, annual audiograms. Personnel will wash their hands with soap and water prior to inserting earplugs to avoid initiating ear infections. All personnel will follow the safety guidelines outlined in URS SMS 26, *Noise and Hearing Conservation*, as provided in Appendix B.

5.3.4 Slip/Trip/Fall Hazards

Workers should exercise caution when walking around the site to avoid fall and trip hazards. If there are holes or uneven terrain in the work area that could cause site personnel to fall or trip, they must be covered, flagged or marked to warn workers. The same is true of tripping hazards that may exist inside of the tunnel.

Workers should exercise caution around open excavations, such as test pits, and avoid getting closer than two feet to the edge of an unsloped excavation unless guardrails or fall protection is provided. If conditions become slippery, workers should take small steps with their feet pointed

slightly outward to decrease the probability of slipping. Gravel or sand should be spread in muddy areas to reduce slipperiness. Workers should watch where they are walking and walk only in areas of good stability. Workers should also exercise caution around open manholes and access shafts.

5.3.5 Heavy Equipment

Operation of heavy equipment during site activities presents potential physical hazards to personnel. All personnel working the vicinity of heavy equipment will follow the safety guidelines outlined in URS SMS 019, *Heavy Equipment Operations*, as provided in Appendix B.

The following precautions must be observed whenever heavy equipment is in use:

- Personal protective equipment (PPE) such as steel-toed shoes, safety glasses or goggles, traffic safety vests and hard hats must be worn whenever such equipment is present.
- Personnel must at all times be aware of the location and operation of heavy equipment, and take precautions to avoid getting in the way of its operation. Never assume that the equipment operator sees you; make eye contact and use hand signals to inform the operator of your intent, particularly if you intend to work near or approach the equipment.
- Traffic safety vests ARE REQUIRED for URS personnel working near mobile heavy equipment, such as backhoes and other excavators.
- Never walk directly in back of or to the side of, heavy equipment without the operator's acknowledgment.
- When an equipment operator must operate in tight quarters, the equipment subcontractor should provide a person to assist in guiding the operator's movements.
- Keep all non-essential personnel out of the work area.
- Any heavy equipment that is used in the exclusion zone should remain in that zone until its task is completed. The equipment subcontractor should completely decontaminate such equipment in the designated equipment decontamination area as required prior to moving the equipment outside of the EZ/CRC.

5.3.6 Underground and Aboveground Utilities

Prior to any excavation activity, the local Dig-Safe number will be called to request utility companies to mark their lines for all off-site locations. For all on-site locations, Detrex must provide clearance. In addition, an area inspection will be made to identify subsurface and overhead utilities through the presence of manholes, pull boxes, valve boxes, utility markers, vent risers, and the like.

The Project Manager or SSO is responsible for locating overhead and underground utilities prior to the commencement of any subsurface (> 0.3 meters (1 ft.)) activities. Resources include site plans, utility companies, and regional utility locating services. The proper utility company

personnel shall certify in writing to the Project Manager or SSO the deactivation of underground utilities, and the certification retained in the project files.

Procedures for activities proximal to utility locations are located in URS SMS 034, found in Appendix B.

Excavation, drilling, crane, or similar operations adjacent to overhead lines shall not be initiated until operations are coordinated with the utility officials. Operations adjacent to overhead lines are prohibited unless one of the following conditions is satisfied:

- Power has been shut off and positive means (e.g. lockout/tagout) have been taken to prevent lines from being energized. Wherever possible, the URS SSO will observe power shut off and place a lock and tag on the switch. In all cases utility company personnel shall certify in writing to the Project Manager or SSO the deactivation of overhead utilities, and the certification retained in the project files. The Project Manager or SSO must also attempt to verify power shut off by checking that power is no longer available to the affected building or equipment.
- Equipment, or any part of the equipment, cannot come within the following minimum clearance from energized overhead lines:

Power Lines Nominal System (kv)	Minimum Required Clearance
0-50	10 feet
51- 200	15 feet
201-300	20 feet
301-500	25 feet
501-750	35 feet
751-1000	45 feet

5.3.7 Lifting Hazards

The following guidelines will be followed whenever lifting equipment such as portable generators, coolers filled with samples, any other objects that are of odd size or shape, or that weigh over 40 pounds. All personnel will follow the safety guidelines outlined in URS SMS 045, *Back Injury Prevention*, as provided in Appendix B.

- Get help when lifting heavy loads. Portable generators will only be lifted using a two-person lift.
- When moving heavy objects such as drums or containers, use a dolly or other means of assistance.

- Plan the lift. If lifting a heavy object, plan the route and where to place the object. In addition, plan communication signals to be used (i.e., "1,2,3, lift," etc.)
- Wear sturdy shoes in good conditions that supply traction when performing lifts.
- Keep your back straight and head aligned during the lift and use your legs to lift the load – do not twist or bend from the waist. Keep the load in front of you – do not lift or carry objects from the side.
- Keeping the heavy part of the load close to your body will help maintain your balance.

5.3.8 Animal Bites

Animals and some insects may bite and thereby pose a health hazard in the form of irritation, illness, or poisoning. Anyone bitten should be given immediate first aid as necessary, and shall be transported to the nearest medical facility. Members of the field investigation team will be properly briefed regarding the potential for encountering insects and animals. Ticks and tick-borne diseases may be of particular concern due to the location of some of the access shafts in swampy areas. The URS SMS 047, *Biological Hazards*, is included in Appendix B.

5.3.9 Use of Personal Protective Equipment

The PPE which may be required for some activities (e.g., polycoated Tyvek® coveralls, waders, respirators, etc.) places a physical strain on the wearer. When PPE such as respirators, gloves, and protective clothing are worn, visibility, hearing, and manual dexterity are impaired. Refer to URS SMS 029, *Personal Protective Equipment* and URS SMS 042, *Respiratory Protection*, as provided in Appendix B.

5.3.10 Work Zone Traffic Control

If URS operations require work performed on roads, highways or other areas where motor vehicles may be a hazard, all personnel will follow the safety guidelines outlined in URS SMS 032, *Work Zone Traffic Control.* A copy of URS SMS 032 is included in Appendix B.

5.3.11 Corrosive and Reactive Materials

Corrosive and reactive materials may be encountered at the site. Corrosive materials may also be used in small quantities as part of the sampling efforts conducted at the site. All personnel with the potential to come in to contact with reactive or corrosive materials should follow URS SMS 009, *Corrosive and Reactive Materials.* Workers handling corrosive or reactive materials should be trained in accordance with URS SMS 002, *Worker Right to Know.* Copies of URS SMS 009 and URS SMS 002 are included in Appendix B.

5.3.12 Drilling Safety Guidelines

Work activities at the Site may require the use of a drill rig or geoprobe rig. All personnel in the vicinity of the operating rig will follow the safety guidelines outlined in URS SMS 056, *Drilling*

Safety Guidelines, as provided in Appendix B. Prior to any excavation activity, the local Dig-Safe number will be called to request utility companies to mark their lines.

5.3.13 Electrical Safety

Electrical hazards may exist at the Site. The following general precautions must be taken to prevent accidental contact with energized sources:

- Overhead lines must be identified and equipment must be kept at least 10 feet from energized lines or any other distance required by local ordinances, whichever is greater. It is important to note that power lines and hoist lines can be moved significantly by wind;
- Drill rigs shall never be moved with the mast erect;
- Underground utilities must be located before drilling or excavating begins. Appropriate utility companies must be contacted before intrusive work begins in accordance with local or state requirements for utility company notification;
- For drilling and excavation at industrial or other locations where underground utilities are owned by the client, as-built drawings of utility locations should be obtained if possible;
- As a general precaution, URS employees shall avoid contact with operating drill rigs or backhoes to reduce the risk of electrical shock should the equipment contact a power line;
- At the first sight of lightning, operations should be stopped and only resumed when conditions permit. Daily weather forecasts should be noted for predictions of electrical storms that may affect field operations.

All personnel using electrical equipment, or personnel in the vicinity of electrical equipment, will follow the safety guidelines outlined in URS SMS 12, *Electrical Safety*, as provided in Appendix B.

5.3.14 Flammable Hazards

A few of the volatile chemicals expected to be present in the soil and groundwater at the site, or the vapors coming off the chemicals, are flammable or combustible. Therefore, URS SMS 14, *Fire Prevention*, and URS SMS 15, *Flammable and Combustible Liquids and Gasses*, included in Appendix B, will be implemented and the following safety precautions will be followed:

- In suspected areas of contamination where excavation or trenching activities are taking place, all non-essential engines shall be turned off. All gas or diesel powered equipment operating in these areas must be equipped with spark arrestors on the exhaust.
- Smoking will be strictly forbidden in work areas. No lighters or matches will be permitted in the investigation areas. Smoking elsewhere on the site will be in accordance with BASF policy.
- A type A-B-C fire extinguisher will be present in each work area.

5.3.15 DOT Shipping

Shipping of hazardous materials may be required at the site. Hazardous materials include, but are not limited to, compressed gases, laboratory reagents, field samples, hazardous wastes and radioactive materials (i.e., Troxler nuclear gauges). Personnel involved in the shipping of materials should follow URS SMS 048, *DOT Shipping*. A copy of URS SMS 048 is included in Appendix B. Questions concerning shipping can also be directed to the URS HazMat Shipping Support Helpline at 800-381-0664.

5.3.16 Site Access and Special Hazards

The Site is an active chemical plant. DNAPL is present in the soil and groundwater . As such, specific hazards, including the presence of hazardous chemicals, may be encountered. The exposure to all hazardous chemicals should be eliminated or reduced. In order to eliminate or reduce hazardous chemical exposure, URS SMS 002, Worker Right to Know; SMS 017, *Hazardous Waste Operations*; and URS SMS 004, *Accessing Industrial Sites* should be followed by all URS personnel on-site. Copies of URS SMS 002, 004 and 017 are included in Appendix B.

Toxic and carcinogenic compounds are also present at the site. URS has developed SMS 050, *Specific Chemical Hazard* to specifically address toxic and carcinogenic compounds. A copy of URS SMS 050 is included in Appendix B. If exposure to these toxic or carcinogenic compounds is suspected, the Project Manager may request Personal Monitoring or Project Specific Medical Examination. A description of the Personal Monitoring and the purpose and scope of this exam is found in URS SMS 043, *Personal Monitoring (Industrial Hygiene)* and URS SMS 024, *Medical Screening & Surveillance*. Copies of URS SMS 043 and 024 are included in Appendix B.

5.3.17 Vehicle Safety Program

URS personnel operating motor vehicles that are owned, rented or leased by URS, and personnel using personal vehicles on company time must comply with URS SMS 57, Vehicle Safety Program. All URS personnel operating motor vehicles on company time are required to complete the 0.5-hour on-line defensive driving training module.

6.1 CHEMICAL EXPOSURE MONITORING

The field instrumentation described in this health and safety plan has been specifically selected for the contaminants that may be reasonably anticipated to be encountered during this course of this project. Selection factors include anticipated airborne concentrations, potential interference, ionization potentials, instrument sensitivity, and occupational exposure limits. The Action Levels specified in Table 9.1 were established with the expectation that specific instruments will be used. DO NOT SUBSTITUTE INSTRUMENTS WITHOUT THE CONSENT OF THE REGIONAL HEALTH AND SAFETY MANAGER.

The monitoring equipment specified in Section 6.4 will be used on a regular basis to evaluate the potential for exposure to airborne contaminants, typically every ten to fifteen minutes. Monitoring will be conducted in the immediate vicinity of the contaminant source point or work area. If readings exceed the first Action Level (> 0.2 ppm for more than one minute), monitoring in the operator's breathing zone (OBZ) of the person working nearest the point of operations/contaminant source will start immediately, and site personnel will don protective clothing.

Readings above the first Action Level will require personnel to upgrade to Level B. The Action Levels and Responses are detailed in Table 9.1.

6.1.1 Personal Exposure Monitoring

In accordance with 29 CFR 1910.120(h), a URS industrial hygienist may perform quantitative personal monitoring on personnel at greatest risk of exposure (i.e., those working in the exclusion zone). The industrial hygienist will determine who to sample based upon site conditions at the time of the sampling. A laboratory accredited by the American Industrial Hygiene Association will perform analyses, and results will be reported and records maintained in accordance with OSHA criteria.

Procedures for personal monitoring are located in Safety Management Standard 43, *Personal Monitoring*, a copy of which is included in Appendix B.

6.2 BACKGROUND READINGS

All direct-reading instrument readings will be evaluated relative to background reading, not "meter zero". Prior to the start of work at each shift, instrument readings will be obtained outside of the work zone in order to determine the level of "background" readings. Site readings will be evaluated against these background readings (i.e., if an action level is listed as 3 ppm, it is evaluated as 3 ppm above background). The SSO should consult with the RHSM regarding the potential health hazards associated with background readings above 0.1 ppm.

6.3 DATA LOGGING

All monitoring data, including background readings, will be logged in the field logbook. The results of daily instrument calibrations can either be logged on the form provided in Attachment C or in the field logbook. All monitoring instruments will be calibrated in accordance with the manufacturer's instructions prior to the start of each shift. Calibration should also be performed when inconsistent or erratic readings are obtained. IF AN INSTRUMENT CANNOT BE CALIBRATED TO SPECIFICATION, OR BECOMES OTHERWISE INOPERABLE, ALL INVASIVE SITE WORK WILL CEASE UNTIL THE INSTRUMENT IS APPROPRIATELY REPAIRED OR REPLACED; the PM or Regional Health and Safety Manager should be contacted for further guidance.

6.4 AIR QUALITY MONITORING INSTRUMENTATION AND TECHNIQUES

Photo Ionization Detector

The HNu Photo Ionization Detector (PID) manufactured by HNu Systems, Inc., or equivalent, equipped with an 11.7 eV lamp, will be used to detect trace concentrations of certain organic gases in the air. The PID detects mixtures of compounds simultaneously. PID readings do not measure concentrations of any individual compound when a mixture of compounds is present. The PID will be calibrated before each 8-hr work shift using an isobutylene standard for calibration. Calibrations will be documented. PID readings will be measured in the breathing zone of the most highly exposed worker (i.e., closest to the source).

6.5 WORK STOPPAGE RESPONSES

The following responses will be initiated whenever one or more of the action levels necessitating a work stoppage is exceeded:

1. The RHSM will be consulted immediately.
2. All personnel will be cleared from the work area.
3. Monitoring will be continued until intrusive work resumes.

Any chemical release to air, water, or soil must be reported to the RHSM at once.

6.6 CALIBRATION OF AIR MONITORING EQUIPMENT

If an instrument can not be calibrated to specification, or becomes otherwise inoperable, all invasive site work will cease until the instrument is appropriately repaired or replaced; the PM or rHSM should be contacted for further guidance.

6.7 MITIGATIVE MEASURES FOR CONTROL OF EMISSIONS

Based on engineering and administrative controls discussed in Section 5, vapor emissions resulting from normal field operations may exceed the response levels. If the response levels are

exceeded at any monitoring location, implementation of mitigative measures to suppress vapor emissions will be required. Appropriate mitigative measures may include ceasing operations until the exact cause of the emissions can be identified and corrected.

6.8 DUST CONTROL

High winds and site operations can cause airborne dust hazards. If site operations generate dust levels that exceed action levels or produce a sustained visible dust, a water mist will be applied to reduce dust generation. If the mist is not effective in reducing dust generation, personnel will upgrade their level of PPE as indicated in Table 9.1.

7.1 PERSONAL PROTECTIVE EQUIPMENT USE

The minimum Personal Protective Equipment (PPE) for site personnel is Level D Modified with the ability to upgrade to Level B. Level D Modified PPE includes the following:

- Hardhat
- Poly-coated Tyvek coveralls
- Safety glasses with side shields (or impact resistant goggles)
- Steel-toed boots or Chemical-resistant steel-toed boots
- Ear protection (as required)
- Gloves
- Traffic safety vest in the vicinity of heavy equipment.

All drilling, sampling and monitoring well installation will be completed in Level B. Table 9.1 provides the description of the incremental PPE requirements relative to specific Action Levels, as well as the specific kinds of PPE to be used. Procedures for use and selection of personal protective equipment are located in URS SMS 029, included in Appendix B.

7.2 LIMITATIONS OF PROTECTIVE CLOTHING

The protective equipment ensembles selected for this project are anticipated to provide protection against the types and concentrations of hazardous materials that may potentially be encountered during field operations. However, no protective garment, glove or boot is resistant to all chemicals at any concentration; in fact, chemicals may continue to permeate or degrade a garment even after the source of the contamination is removed.

In order to obtain optimum usage from PPE, the following procedures are to be followed by all URS personnel:

- When using disposable coveralls, don a clean, new garment after each rest break or at the beginning of each shift
- Inspect all clothing, gloves and boots both prior to and during use for:
  - Imperfect seams
  - Non-uniform coatings
  - Tears
  - Poorly functioning closures
- Inspect reusable garments, boots and gloves both prior to and during use for:
  - Visible signs of chemical permeation such as swelling, discoloration, stiffness or brittleness

- Cracks or any signs of puncture or abrasion

Any reusable garments exhibiting any such characteristics will be discarded.

7.3 DURATION OF WORK TASKS

The duration of work tasks in which personnel use PPE ensembles that include chemical protective clothing (including tyvek), will be established by the SSO. Variables to be considered include ambient temperature and other weather conditions, the capacity of individual personnel to work in the required level of PPE in heat and cold, and the limitations of specific PPE ensembles. Rest breaks will be scheduled according to heat stress monitoring protocols as described in URS SMS 18. A copy of URS SMS 18 is included in Appendix B.

7.4 PERSONAL PROTECTIVE EQUIPMENT SELECTION

Since personnel working onsite may encounter elevated levels of hazardous airborne contaminants released during excavation activities, or may come in contact with contaminants in wastes or soils, varying levels of protection must be available. The level of protection will be minimal in the offsite and support areas, and maximal in the active drilling or excavation portion of the site. The purpose of personal protective equipment is to isolate personnel working onsite from the chemical, physical, and biological hazards present onsite. Careful selection of adequate personal protective equipment should protect the respiratory system, skin and body, face and eyes, feet and hands, head, and hearing.

It is anticipated that Level B protection will be utilized during most of the on-site activities. If a higher level of personal protection is required at any time, the SSO will instruct personnel to upgrade and the RHSM will be contacted. Components of all applicable levels of personal protection are listed in Table 7.1.

8.1 RESPIRATOR SELECTION

Engineering controls and safe work practices (e.g. elimination of the source of contamination, ventilation equipment, working upwind, limiting exposure time, etc), must always be the primary control for air contaminants. Respirators will be used if engineering or administrative controls are not feasible for controlling airborne exposures below acceptable concentrations and as an interim control measure while additional engineering or administrative controls are implemented.

Once the need for respirators has been established, the respirators will be selected on the basis of the hazards to which the worker is exposed. Only NIOSH-approved respirators will be issued. Selection criteria established in 29 CFR 1910.134 has been used by the HSP Preparer in determining respirator requirements for this project.

> *CAUTION: Full-face piece or half-face piece air-purifying respirators are not to be used where there is an oxygen deficiency. Only air-supplied respirators with an emergency escape cylinder or self-contained breathing apparatus will be worn when an oxygen deficiency exists.*
>
> *CAUTION: A respirator does not protect against excessive heat or against hazardous substance that can attack the body through the skin.*

The forms of the airborne contaminants have been evaluated based upon the suspected contaminants of concern. Evaluation of the concentration of the airborne chemical hazard will be performed using direct reading instruments to determine what type respirator will be used. Airborne readings will be compared to Action Levels in Table 9.1. See action level/respirator requirements in Section 6.

8.2 MEDICAL SCREENING

URS employees are enrolled in the URS Medical Surveillance Program and are medically evaluated in compliance with the requirements of 29 CFR 1910.134(a)(10).

The medical status of each employee is reviewed annually and as may be deemed necessary by the examining physician if the physical status of the employee changes.

8.3 FIT TESTING

A person wearing a respirator must be clean-shaven in the area of the face piece seal. Long hair, sideburns, and skullcaps that extend under the seal are not allowed. Glasses with temple pieces extending under the seal are not allowed for full-face respirators. Persons with facial conditions that prevent a proper seal are not allowed to wear a respirator until the condition is corrected. Facial conditions that may cause a seal problem include missing dentures, scars, severe acne, etc. Contact lenses may be worn with respiratory protection.

No individual will enter an area where the use of respiratory protective equipment is required unless the person has been fit tested within the last year. Fit testing will be performed in accordance with accepted fit test procedures defined in URS SMS 42, included in Appendix B.

8.4 RESPIRATOR USE INSTRUCTION

Only those employees who have been properly trained and qualified on the specific type of respirator to be worn may use respirators. No individual will enter an area where the use of respiratory protective equipment is required unless the person has been trained.

All employees whose job assignment requires the use of respirators are given training in accordance with 29 CFR 1910.134 during initial 40-hour and annual Refresher training for hazardous waste operations.

Hands-on training on inspecting and donning a respirator, including user seal checks, was also provided at the time of fit testing. Retraining is performed annually on each type of respirator worn by the individual. In addition, site-specific respirator training is provided during Site Safety Briefings conducted by the SSO. Training records are kept in the employee's training file.

Particulate respirator cartridges should be changed out when the wearer has difficulty breathing through the cartridges. Chemical gas or vapor respirator cartridges will be *changed out at least daily.*

The fit of a chemical gas or vapor respirator should be rechecked and the cartridges changed if the wearer detects chemical odor or feels chemical irritation on the skin, both indicators of leakage or cartridge breakthrough.

8.5 RESPIRATOR INSPECTION

The user will inspect respirators before and after each day's use.

Inspection procedure, air purifying respirators (full-face piece and half-face piece cartridge respirators):

Examine the face piece for:

- Excessive dirt
- Cracks, tears, holes, or distortion from improper storage
- Inflexibility
- Cracked or badly scratched lenses (full-face only)
- Incorrectly mounted eyeglass lenses or broken or missing mounting clips (full-face only)
- Cracked or broken air purifying element holder, badly worn threads, or missing gaskets

Examine the head straps or head harness for:

- Breaks or cracks
- Broken or malfunctioning buckles
- Excessively worn serration on the headstraps, which may permit slippage

Examine the inhalation valves (2) and exhalation valve for:

- Foreign material (e.g. hairs, particles, etc.)
- Improper insertion of the valve body in the face piece
- Cracks, tears, or chips in the valve body, particularly in the sealing surface
- Missing or defective exhalation valve covers

Examine the air-purifying cartridge for:

- Missing or worn cartridge holder gasket
- Incorrect cartridge/canister for the hazard
- Incorrect cartridge installation, loose connections, or cross threading in the holder
- Cracks or dents in the outside case or threads of filter or cartridge/canister

8.6 CLEANING OF RESPIRATORS

Respirators assigned and worn by one individual must be dismantled and thoroughly cleaned and disinfected after each day's use. Visitor's or multi-assigned respirators must be cleaned and disinfected after each use. A disinfectant spray or wipe is approved as a disinfectant between uses during the day but not for cleaning and sanitizing after each day's use. Care must be taken to prevent damage from rough handling during the cleaning procedure. After cleaning, respirators must be reassembled.

Respirator Cleaning Procedure

Washing: Disassemble and wash with a mild liquid detergent in warm water (not to exceed 110^0F). A stiff bristle (not wire) brush may be used.

Rinsing: Rinse in clean water (110^0F maximum) to remove all traces of detergent. This is very important to prevent dermatitis.

Disinfecting: Thoroughly rinse or immerse in a sanitizer provided by the manufacturer. Alternatively, a weak chlorine bleach solution (1 milliliter liquid bleach/liter of water) may be used.

Final Rinsing: Rinse thoroughly in clean water (110^0F maximum) to remove all traces of disinfectant. This is very important to prevent dermatitis.

Drying: Drain and dry hanging by the straps from racks (take care to prevent damage) or towel drying with clean soft clothes or paper towels.

8.7 MAINTENANCE OF RESPIRATORS

Routine respirator maintenance such as replacing missing valves, gaskets, nosecups etc., must only be performed by trained respirator users or a respirator manufacturer's representative. Only approved replacement parts must be used. Substitution of parts from a different brand or type of respirator is generally not possible, invalidates the technical approval of the respirator, and is not permitted. Any respirator suspected of being defective must be removed from service and replaced.

8.8 STORAGE OF RESPIRATORS

When not in use, respirators must be stored to protect them from dust, sunlight, heat, extreme cold, excessive moisture, damaging chemicals, and physical damage. Respirators must be stored in sealable (e.g. Ziplock® or twist-tie) reusable plastic bags between shifts.

The respirator storage environment must be clean, dry, and away from direct sunlight. Onsite cabinets or cases are suggested. Storing bagged respirators in vehicles is discouraged due to the potential for damage from other material or equipment.

8.9 ADDITIONAL INFORMATION

Additional information on the URS Respiratory Protection Program is located in URS SMS 42, included in Appendix B.

9.1 GENERAL

Barricade tape and/or barricades shall be used to delineate a work zone for safety purposes around the work area. The barriers should be set in a 25-foot radius (as practical) around the work area to provide sufficient maneuvering space for personnel and equipment. A short piece of barricade tape can be affixed to a secure upright (e.g., crane mast or vehicle antenna) to serve as a wind direction telltale. A five-foot opening in the barricades at the support zone (upwind of the work area) will serve as the personnel and equipment entry and exit point. The personnel decontamination station will be established at this point if formal decontamination procedures are required (see Section 9.0). All entry and exit from the work area will be made at this opening in order to control potential sources of contamination and leave contaminated soil and debris in the work area.

The PM or SSO *(with the assistance of the facility representative)* will determine an upwind evacuation area prior to each shift during excavation activities, and all personnel will be notified of its location. The PM or SSO establish a signal to use in the event of an emergency. Once this signal has been given, all personnel must immediately stop work and proceed to the evacuation area.

The SSO will verify that all site visitors sign the visitors' log. In addition, all URS personnel and site visitors entering the work area must present evidence of their participation in a medical surveillance program and completion of health and safety training programs that fulfill the requirements of this plan. These documents will be maintained on-size for the duration of this project.

The SSO will provide site hazard and emergency action information to all site visitors before they enter the site. Visitors will review and sign the Safety Plan Compliance Agreement.

9.2 WORK ZONES

Prior to the commencement of any intrusive activity at the site, work zones must be established as described below.

- Exclusion Zone – A 25-foot (as practical) circle around the work area will be defined before work starts. The encircled area will constitute the "Exclusion Zone". This zone is where potentially hazardous contaminants and physical hazards to the workers will be contained. Appropriate personal protection as described in Section 7 will be required in this area. Plastic sheeting (visqueen) and/or tarps may be used as necessary to control contaminated materials spilled to the ground during site operations. The size of the Exclusion Zone may be altered to accommodate site conditions and to ensure contaminant containment.
- Contamination Reduction Zone (CRZ) – a corridor leading from the Exclusion Zone will be defined, and will lead from the work area to a break area. All decontamination activities will occur in the CRZ. A waste container will be placed at the end of the corridor so contaminated disposable equipment can be placed inside and covered. Surface/soil contamination in this area should be controlled using plastic sheeting. No one will be

permitted into the Contamination Reduction Zone or Exclusion Zone unless they are in full compliance with the requirements of this Plan.

- Support Zone – a Support Zone, the outermost part of the site, must be defined for each field activity. Support equipment is located in this uncontaminated or clean area. Normal work clothes are appropriate within this zone. The location of this zone depends on factors such as accessibility, wind direction (upwind of work area), and resources (i.e., roads, shelter, utilities).

When exiting the exclusion zone, or if the monitoring instrument readings indicate respirator use during work activities, the following steps will be followed whenever personnel leave the exclusion zone/work area:

1. Remove all equipment, sample containers, and notes to the CRZ. Obtain decontamination solutions (bleach, soap and water) and decon tools (shovels, auger flights, etc.) by brushing them with the decontamination solutions and then under a water rinse. A high-pressure steam cleaner may also be used for decon. All waste and spent decon solutions will be discharged into the sewer.
2. Scrub boots with a stiff bristle brush using bleach and soap, and then rinse with water. Washtubs and chairs will be provided.
3. Wash Nomex coverall using bleach and soap, and then rinse with water. Washtubs and chairs will be provided.
4. Remove outer gloves (and boot covers, if used).
5. Remove Nomex coverall; place Nomex coverall in provided container for reuse.
6. Remove Tyvek coveralls and place in disposal drum.
7. Remove hardhat and eye protection.
8. Remove respirator.
9. Remove inner gloves.
10. Wash hands and face.

The decontamination area will be covered with plastic sheeting, which will be replaced when torn or heavily soiled, and at the end of each shift.

Each worker will be responsible for cleaning, sanitizing and storing their own respirator in accordance with manufacturer's guidance (i.e., washing in warm water and detergent or sanitizing solution, air drying, and storing in a plastic storage bag; see Section 8). Cartridges will be changed in accordance with the procedures described in Section 8.4.

All spent decontamination fluids (rinse waters, etc.) shall be handled as directed by the PM and in accordance with relevant regulations.

Decontamination procedures are also detailed in the Quality Assurance Project Plan (QAPP) and the CMI Work Plan. Where procedures conflict, the most stringent will apply.

10.1 SANITATION

Potable water will be made available at the site, either from a pressurized source or commercially available bottled water. Drinking cups will be supplied so personnel will neither drink directly from the source of water nor have to share drinking cups. Sources of non-potable water shall be clearly labeled as such.

Unless toilet facilities are available on site or transportation is readily available to transport personnel to nearby (within five minutes) toilet facilities, portable toilet facilities, such as chemical toilets, will be provided on site.

Washing facilities will be provided on site, and will be located in the decontamination area or the support area. Soap, clean water, wash basins and single-use towels will be available for personnel use.

URS procedures for site sanitation are located in Safety Management Standard 30, a copy of which is included in Appendix B.

10.2 DECONTAMINATION – MEDICAL EMERGENCIES

In the event of physical injury or other serious medical concerns, immediate first aid is to be administered in lieu of further decontamination efforts.

See Emergency Decontamination chart for a decision tree for emergency decontamination.

10.3 DECONTAMINATION OF TOOLS

When all work activities have been completed, contaminated tools used by URS personnel will be either appropriately decontaminated or properly disposed of as hazardous waste.

It is expected that all tools will be constructed of non-porous, non-absorbent materials. This will aid the decontamination process. Any tool, or part of a tool, which is made of a porous/absorbent material will be discarded and disposed of as a hazardous waste if it cannot be properly decontaminated.

Tools will be placed on a decontamination pad or into a bucket and thoroughly washed using a soap solution and brushing, followed by a fresh water rinse. All visible particles are to be removed before the tool is considered clean.

11.1 GENERAL

1. Eating, drinking, chewing gum or tobacco, and smoking are prohibited in the contamination reduction zone (CRZ) or where the possibility for the transfer of contamination exists.
2. All personnel will enter designated work areas only through the CRZ. All personnel leaving an exclusion/work zone must exit through the CRZ and pass through the decontamination station as described in Section 10.0.
3. Personnel will wash their hands and face thoroughly with soap and water prior to eating, drinking or smoking.
4. Avoid contact with potentially contaminated substances. Avoid, whenever possible, kneeling, leaning or sitting on contaminated surfaces. Do not place monitoring equipment on potentially contaminated surfaces.
5. All field crew members should make use of their senses to alert them to potentially dangerous situations in which they should not become involved (i.e., presence of strong, irritating or nauseating odors).
6. Only those vehicles and equipment required to complete work tasks should be permitted within the exclusion/work zone (cranes, excavators, and similar items). All non-essential vehicles should remain within the support zone.
7. Containers, such as drums, will be moved only with the proper equipment and will be secured to prevent dropping or loss of control during transport.
8. Field survey instruments, such as CGIs, should be covered with plastic or similar covering to minimize the potential for contamination.
9. No matches or lighters will be permitted in the exclusion zone or CRZ.
10. Contaminated protective equipment, such as respirators, hoses, boots, and disposable protective clothing, will not be removed from the exclusion zone or decontamination area until it has been cleaned, or properly packaged and labeled.
11. Prevent, to the extent possible, spills. In the event that a spill occurs, contain liquid if possible.
12. Prevent splashing of the contaminated materials.
13. Field crewmembers shall be familiar with the physical characteristics of the site operations including:
    - Wind direction in relation to the contaminated area;
    - Accessibility to equipment and vehicles;
    - Areas of known or suspected contamination;
    - Site access; and,
    - Nearest water sources.

14. The number of personnel and equipment in the exclusion zone should be minimized but only to the extent consistent with workforce requirements of safe site operations.
15. All wastes generated by URS activities at the site will be disposed of as directed by the PM.
16. All personal protective equipment will be used as specified and required.
17. The buddy system will be used at all times when conducting sewer rehabilitation work or when working in remote areas.
18. Personnel are to immediately notify the SSO or Site Manager if any indications of potential explosions or unusual conditions are observed.

11.2 SAMPLING PRACTICES

For all sampling activities, the following standard safety procedures shall be employed:

1. All sampling equipment should be cleaned before proceeding to the site.
2. At the sampling site, sampling equipment should be cleaned after each use.
3. Work in "cleaner" areas should be conducted first where practical.
4. All unauthorized personnel will remain outside exclusion zones at all times.

11.3 SAMPLE SHIPMENT/HAZARDOUS MATERIALS SHIPMENT

Shipping of hazardous materials may be required at the site. Hazardous materials include, but are not limited to, compressed gases, laboratory reagents, filed samples, hazardous wastes and radioactive materials (i.e., Troxler nuclear gauges). Personnel involved in the shipping of materials should follow URS SMS 048, *DOT Shipping*. A copy of URS SMS 048 is included in Appendix B. If hazardous materials are to be shipped, then they must be shipped in accordance with those regulations by an individual who is certified as having been Function-Specific trained as required under the DOT regulations. Questions concerning shipping can also be directed to the URS HazMat Shipping Support Helpline at 800-381-0664.

It is URS policy to evacuate personnel from areas involved in hazardous material emergencies and to summon outside assistance from agencies with personnel trained to respond to the specific emergency. This section outlines the procedures to be followed by URS personnel in the event of a site emergency. These procedures are to be reviewed during the onsite safety briefings conducted by the SSO.

In the event of a fire or medical emergency, the emergency numbers identified on Table 12.1, *Emergency Contacts*, in Appendix C can be called for assistance.

12.1 PLACE OF REFUGE

In the event of a site emergency requiring evacuation, all personnel will evacuate to a pre-designated area that is located a safe distance from any health or safety hazard (typically the URS field office, unless conditions dictate otherwise). The SSO ***(in cooperation with a facility representative)*** will designate a primary assembly area prior to the start of work each day. The daily pre-designated assembly area may have to be re-designated by the SSO in the event of an emergency where the area of influence affects the primary assembly area. Once assembled, the SSO shall take a head count. The SSO will evaluate the assembly area to determine if the area is outside the influence of the situation; if not, the SSO will redirect the group to a new assembly area where a new head count will be taken.

During any site evacuation, all employees shall be instructed to observe wind direction indicators. During evacuation, employees will be instructed to travel upwind or crosswind of the area of influence. The SSO will provide specific evacuation instructions, via the site emergency radio if necessary, to site personnel regarding the actual site conditions.

12.2 COMMUNICATION

A communication network must be set up to alert site personnel of emergencies and to summon outside emergency assistance. Where voice communication is not feasible an alarm system (i.e., sirens, horns, etc.) should be set up to alert employees of emergencies. Radio communication may also be used to communicate with personnel in the exclusion zone. Where phone service is not readily available, radios or portable phones should be used to communicate with outside agencies. Site personnel should be trained on the use of the site emergency communication network. Emergency phone numbers shall be posted at the phone or radio used for outside communication. The SSO is responsible for establishing the communication network prior to the start of work, and for explaining it to all site personnel during the site safety briefing.

In the event of an emergency, personnel will use the following hand signals where voice communications are not feasible:

Signal	Definition
Hands clutching throat	Out of air/can't breathe
Hands on top of head	Need assistance

Thumbs up	OK/I'm alright/I understand
Thumbs down	No/negative
Arms waving upright	Send back support
Grip partner's wrist	Exit area immediately

12.3 EMERGENCY RESPONSE PROCEDURES

12.3.1 Emergency Response Team

The emergency response team will consist of employees who assume the following roles:

- Emergency Care Provider(s)
  - Provide first aid/CPR as needed.
- Communicator
  - The role of the communicator is to maintain contact with appropriate emergency services, providing as much information as possible, such as the number injured, the type and extent of injuries, and the exact location of the accident scene. The communicator should be located as close to the scene as possible in order to transmit to the emergency care providers any additional instructions that may be given by emergency services personnel in route.
- SSO
  - The SSO should survey and assess existing and potential hazards, evacuate personnel as needed, and contain the hazard. Follow up responsibilities include replacing or repairing damaged equipment, documenting the incident, and notifying appropriate personnel/agencies described under incident reporting. It also includes reviewing and revising site safety and contingency plans as necessary.

In the event of an emergency, follow the procedure outlined in the Emergency Response Checklist on the following page. Notify site personnel of the situation. Survey the scene to determine if the situation is safe, to determine what happened, and to search for other victims. The Emergency Response Checklist can be used to help remember the things to do in an emergency.

EMERGENCY RESPONSE CHECKLIST

In an Emergency	Yes	No
Confirm the reported incident	_____	_____
Evacuate and secure the area	_____	_____
Render first aid/emergency medical care	_____	_____
Notify promptly:		
Superintendent	_____	_____
Project Manager	_____	_____
Fire Department	_____	_____
Police Department	_____	_____
Nearest Hospital or Medical Care Facility	_____	_____
Start Documentation	_____	_____
If spill or leak occurs:		
Don the proper PPE	_____	_____
Stop the source	_____	_____
Contain the spill	_____	_____
Clean up the spill	_____	_____
Upon evacuating, take attendance at the assembly area	_____	_____
Authority given:		
Leave the site	_____	_____
Restart the operations	_____	_____
Debrief and document the incident	_____	_____
A copy of the document submitted to the RHSM	_____	_____

12.4 MEDICAL EMERGENCY RESPONSE PLAN

At least one URS employee on site will hold a current certificate in American Red Cross Standard First Aid. This training provides six and one-half hours of Adult CPR and Basic First Aid. If a medical emergency exists, consult the emergency phone number list and request an ambulance immediately. Perform First Aid/CPR as necessary, stabilize the injured, decontaminate if necessary, and extricate only if the environment they are in is dangerous or unsafe and ONLY if the rescuers are appropriately protected for potential hazards they may encounter during the rescue. When emergency services personnel arrive, communicate all first aid activities that have occurred. Transfer responsibility for care of the injured/ill to the emergency services personnel.

The following items and emergency response equipment will be located within easy access at all times:

- First Aid Kit and Infection Control Kit;
- Eyewash – A 15 minute eyewash (required if corrosives are present) or an appropriate amount of portable sterile eyewash bottles will be available on site for flushing foreign particles or contaminants out of eyes. The SSO will demonstrate the proper operation of the unit(s) prior to the start of work;
- Emergency Phone Numbers List; and
- Portable radios for emergency communications in remote areas.

Drugs, inhalants, or medications shall not be included in the First Aid Kit.

Supplies should be re-ordered as they are used. A monthly inventory must be done on the first aid kit and infection control kit contents and supplies re-ordered that have been used and not reported.

Directions to the Hospital:

Ashtabula County Medical Center
2420 Lake Avenue
Ashtabula, Ohio 44004

Phone Number: 440-997-6600

Exiting the site to State Road, turn left (south) travel approximately 0.75 mile turn right (west) at the first road which is east 21st Street. You will cross State Route 11 continue on to the stop sign. At the stop sign turn left (south) onto Columbus Avenue for approximately 0.25 miles turn right (west) at the flashing light onto east 23rd . Travel on east 23rd to the stop sign at Harbor avenue. Turn left (south) on Harbor and then an immediate right onto east 24th street. The hospital is on the south east corner of east 24th street and Lake Avenue.

12.5 INCIDENT REPORT

All site injuries and illnesses must be reported to the SSO and PM immediately following first-aid treatment. The SSO will notify the Regional Health and Safety Manager. Work is to be stopped until the PM or SSO and RSO have determined the cause of the incident and have taken the appropriate action to prevent a reoccurrence. Any injury or illness, regardless of severity, is to be reported. A copy of the URS incident report form SMS 49 is included in Appendix D.

12.6 OPERATION SHUTDOWN

Under certain extreme hazardous situations the SSO or SSR may request that site operations be temporarily suspended while the underlying hazard is corrected or controlled. During operation shutdown, all personnel will be required to stand upwind to prevent exposure to fugitive emissions. The SSO, with concurrence from the Regional Health and Safety Manager, will have ultimate authority for operations shutdown and restart.

12.7 SPILL OR HAZARDOUS MATERIALS RELEASE

Small spills are immediately reported to the SSO and are dealt with according to the chemical manufacturer's recommended procedures found on the MSDS. Steps will be taken to contain and/or collect small spills for approved storage and disposal.

In the unlikely event of a larger release of hazardous materials as a result of site activities, site personnel will evacuate to the predesignated assembly area. The local fire department and the Ohio EPA Emergency Response Unit (1-800-282-9378) will be notified by the SSO immediately and appropriate actions will be taken to protect the public health and mitigate the contaminant release. The Ohio EPA Emergency Response Unit can also be reached through the local police or fire department. The Project Manager will make the following emergency contacts:

Agency Name (and Address)	***Telephone No.***
• Fire Department	911 or 440-997-4641
• Police Department	911 or 440-992-7172
• Ashtabula County Medical Center 2420 Lake Avenue Ashtabula, Ohio 44004	440-997-6600

URS Health and Safety Management and Field Personnel

• Jim Anderson	Project Manager	216-622-2400 After work hours 440-315-8017 or 440-985-1303
• Bill Clayton	URS Site Safety Officer	216-622-2400
• Cece Weldon	Regional Health and Safety Manager	248-553-9449 (Cell) 248-752-3405

Environmental Protection Agency

• Ohio EPA Emergency Response Unit	800-282-9378
• Ohio EPA	614-466-8500

13.1 TRAINING AND MEDICAL SURVEILLANCE

All URS site personnel will have met the requirements of 29 CFR 1910.120(e), including:

- Forty hours of initial off-site training or its recognized equivalent
- Eight hours of annual refresher training for all personnel (as required);
- Eight hours of supervisor training for personnel serving as Site Safety Officers
- Three days of work activity under the supervision of a trained and experienced supervisor

All URS site personnel entering confined spaces will have met the requirements of 29 CFT 1910.146. including:

- Completion of the eight hour confined space training offered by URS or equivalent training.

All URS site personnel are participating in medical surveillance programs that meet the requirements of 29 CFR 1910.120(f). Current copies of training certificates and statements of medical program participation for all URS personnel are maintained by the local office.

In addition, all URS site personnel will review this HSP and sign a copy of the Safety Plan Compliance Agreement, which is found in Attachment B. The PM will maintain these agreements at the site, and place them in the project file at the conclusion of the operation.

Prior to the start of operations at the site, the SSO will conduct a site safety briefing, which will include all personnel involved in site operations. At this meeting, the SSO will discuss:

- Contents of this HSP
- Types of hazards at the site and means for minimizing exposure to them
- The type of monitoring that will be performed
- Action levels for upgrade and downgrade of personal protective equipment
- Personal protective equipment that will be used
- Site-specific respiratory protection requirements
- Decontamination protocol
- Site control measures, including safe operating practices and communication
- Location and use of emergency equipment
- Evacuation signals and procedures

All site personnel, including subcontractor personnel, are to attend the briefings and sign the briefing form.

Subsequent site safety briefings will be conducted at least weekly, or whenever there is a change in task or significant change in task location. Briefings will also be conducted whenever new personnel report to the site.

13.2 SITE INSPECTIONS

The URS Project Manager or Site Safety Officer is to conduct a daily site inspection prior to the start of each shift. It is the responsibility of the Project Manager or Site Manager to resolve discrepancies immediately, contacting the Office Health and Safety Manager and Regional Health and Safety Manager if necessary for assistance. Inspections are to be documented and maintained on site until the completion of the project, at which time will be placed in the project files.

The PM and SSO are responsible for site record keeping. Prior to the start of work, they will review this plan; if there are no changes to be made, they will sign the approval form (PM) or acceptance form (SSO) and forward a copy to the Office Health and Safety Manager.

All URS personnel will review the HSP and sign the Safety Plan Compliance Agreement in Attachment B; copies of these forms will be maintained in the project file as noted in Section 12.

The SSO will conduct a Site Safety Briefing in accordance with Section 13 and have all attendees sign the form in Attachment B; copies will be maintained in the project file.

Any incident or exposure incident will be investigated and the Incident Report form (SMS 049) will be completed and forwarded to the Office Human Resources Representative and the Regional Health and Safety Manager.

All instrument readings and calibrations, PPE use and changes, health and safety-related issues, and deviations from or problems with this HSP will be recorded in the field log.